

THAT WHICH IS CLAIMED IS:

1. In the processing of poultry, the improvement which comprises disinfecting equipment, instruments, apparatus and/or water used in such processing, and/or carcasses and/or other parts of poultry resulting from such processing, with a halogen-based microbiocide which is:

- (I) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of (a) bromine, chlorine, or bromine chloride, or any two or all three thereof, and (b) a water-soluble source of sulfamate anion; or
- (II) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dihalo-5,5-dialkylhydantoin in which one of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms; or
- (III) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms: or
- (IV) any two or more of (I), (II), and (III).

2. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of (a) bromine, chlorine, or bromine chloride, or any two or all three thereof, and (b) a water-soluble source of sulfamate anion.

3. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen

species, which solution is a derivative product in an aqueous medium of (a) bromine or bromine chloride, or both, and (b) a water-soluble source of sulfamate anion.

4. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dihalo-5,5-dialkylhydantoin in which one of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms.

5. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one N,N'-bromochloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms.

6. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one N,N'-bromochloro-5,5-dimethylhydantoin.

7. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one N,N'-bromochloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, and of at least one 1,3-dichloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms.

8. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of N,N'-bromochloro-5,5-dimethylhydantoin, and of 1,3-dichloro-5-ethyl-5-methylhydantoin.

9. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms.

10. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of 1,3-dibromo-5-isobutyl-5-methylhydantoin, 1,3-dibromo-5-n-propyl-5-methylhydantoin, or 1,3-dibromo-5-ethyl-5-methylhydantoin, or of any two or all three thereof.

11. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least two of the 1,3-dibromo-5,5-dialkylhydantoins of (III) in which one of them is 1,3-dibromo-5,5-dimethylhydantoin.

12. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of 1,3-dibromo-5,5-dimethylhydantoin and of 1,3-dibromo-5-ethyl-5-methylhydantoin.

13. The improvement of Claim 1 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of 1,3-dibromo-5,5-dimethylhydantoin.

14. The improvement of any of Claims 1 to 13, both inclusive, wherein the equipment, instruments, apparatus and/or water or carcasses and/or other parts of poultry resulting from such processing being disinfected has therein or thereon at least one of *Escherichia coli*, *Salmonella enteritidis*, *Salmonella typhimurim*, *Campylobacter jejuni*, *Campylobacter coli*, *Campylobacter lari*, *Listeria monocytogenes*, *Pseudomonas fluorescens*, *Pseudomonas aeruginosa*, *Enterococcus faecium*, and *Staphylococcus aureus*.

15. In the processing of poultry, the improvement which comprises disinfecting equipment, instruments, apparatus and/or water used in such processing, and/or carcasses and/or other parts of poultry resulting from such processing, with a halogen-based microbiocide comprising (i) an aqueous microbiocidal solution of one or more active halogen species, said species resulting from a reaction in water or an aqueous medium between bromine, chlorine, or bromine chloride, or any two or all three thereof, and a water-soluble source of sulfamate anion, or (ii) an aqueous microbiocidal solution of at least one 1,3-dihalo-5,5-dialkylhydantoin in which one of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms. or (iii) an aqueous microbiocidal solution of at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms, or (iv) any two or more of (i), (ii), and (iii).

16. The improvement of Claim 15 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of one or more active halogen species, said species resulting from a reaction in water or an aqueous medium between

bromine, chlorine, or bromine chloride, or any two or all three thereof, and a water-soluble source of sulfamate anion.

17. The improvement of Claim 16 wherein said one or more active halogen species result from a reaction in water or an aqueous medium between bromine or bromine chloride, or both, and a water-soluble source of sulfamate anion.

18. The improvement of Claim 15 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of at least one N,N'-dihalo-5,5-dialkylhydantoin in which one of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms.

19. The improvement of Claim 18 wherein said at least one N,N'-dihalo-5,5-dialkylhydantoin is at least one N,N'-bromochloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms.

20. The improvement of Claim 19 wherein said N,N'-bromochloro-5,5-dialkylhydantoin is N,N'-bromochloro-5,5-dimethylhydantoin.

21. The improvement of Claim 18 wherein said at least one N,N'-dihalo-5,5-dialkylhydantoin is at least one N,N'-bromochloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, and at least one 1,3-dichloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms.

22. The improvement of Claim 21 wherein said N,N'-bromochloro-5,5-dialkylhydantoin is N,N'-bromochloro-5,5-dimethylhydantoin and said 1,3-dichloro-5,5-dialkylhydantoin is 1,3-dichloro-5-ethyl-5-methylhydantoin.

23. The improvement of Claim 15 wherein the microbiocide used comprises a microbiocidal amount of an aqueous microbiocidal solution of at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms.

24. The improvement of Claim 23 wherein said at least one 1,3-dibromo-5,5-dialkylhydantoin is 1,3-dibromo-5-isobutyl-5-methylhydantoin, 1,3-dibromo-5-n-propyl-5-methylhydantoin, 1,3-dibromo-5-ethyl-5-methylhydantoin, or any two or all three thereof.

25. The improvement of Claim 23 wherein said at least one 1,3-dibromo-5,5-dialkylhydantoin is a mixture of at least two of said 1,3-dibromo-5,5-dialkylhydantoins in which one of them is 1,3-dibromo-5,5-dimethylhydantoin.

26. The improvement of Claim 23 wherein said at least one 1,3-dibromo-5,5-dialkylhydantoin is a mixture of 1,3-dibromo-5,5-dimethylhydantoin and 1,3-dibromo-5-ethyl-5-methylhydantoin.

27. The improvement of Claim 23 wherein said at least one 1,3-dibromo-5,5-dialkylhydantoin is 1,3-dibromo-5,5-dimethylhydantoin.

28. The improvement of any of Claims 15 to 27, both inclusive, wherein the equipment, instruments, apparatus and/or water or carcasses and/or other parts of poultry resulting from such processing being disinfected has therein or thereon at least one of *Escherichia coli*, *Salmonella enteritidis*, *Salmonella typhimurim*, *Campylobacter jejuni*, *Campylobacter coli*, *Campylobacter lari*, *Listeria monocytogenes*, *Pseudomonas fluorescens*, *Pseudomonas aeruginosa*, *Enterococcus faecium*, and *Staphylococcus aureus*.

29. In a process of slaughtering poultry, which comprises a step wherein the poultry carcasses or parts thereof are washed with water, the improvement comprising

introducing into said water in an amount effective to provide microbiocidal activity, a halogen-based microbiocide which as introduced is in the form of:

- (I) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of (a) bromine, chlorine, or bromine chloride, or any two or all three thereof, and (b) a water-soluble source of sulfamate anion; or
- (II) (A) at least one 1,3-dihalo-5,5-dialkylhydantoin in which one of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, or (B) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dihalo-5,5-dialkylhydantoin in which one of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, or (C) both (A) and (B); or
- (III) (D) at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms, or (E) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms, or (F) both (D) and (E); or
- (IV) any two or more of (I), (II), and (III);

30. The improvement of Claim 29 wherein said microbiocide comprises (A) at least one 1,3-dihalo-5,5-dialkylhydantoin in which one of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, or (B) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dihalo-5,5-dialkylhydantoin in which one

of the halogen atoms is a chlorine atom and the other is a chlorine or bromine atom, and in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, or (C) both (A) and (B).

31. The improvement of Claim 29 wherein said microbiocide comprises (G) at least one N,N'-bromochloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, or (H) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one N,N'-bromochloro-5,5-dialkylhydantoin in which each of the alkyl groups, independently, contains in the range of 1 to about 4 carbon atoms, or (I) both (G) and (H).

32. The improvement of Claim 29 wherein said microbiocide comprises (J) at least one N,N'-bromochloro-5,5-dimethylhydantoin or (K) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one N,N'-bromochloro-5,5-dimethylhydantoin, or (L) both (J) and (K).

33. The improvement of Claim 29 wherein said microbiocide comprises (D) at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms, or (E) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dibromo-5,5-dialkylhydantoin in which one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms, or (F) both (D) and (E).

34. The improvement of Claim 29 wherein said microbiocide comprises (M) at least one 1,3-dibromo-5,5-dialkylhydantoin selected from the group consisting of 1,3-dibromo-5,5-dimethylhydantoin, 1,3-dibromo-5-ethyl-5-methylhydantoin, 1,3-dibromo-5-n-propyl-5-methylhydantoin, and 1,3-dibromo-5-isobutyl-5-methylhydantoin, or (N) an aqueous

microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of at least one 1,3-dibromo-5,5-dialkylhydantoin selected from the group consisting of 1,3-dibromo-5,5-dimethylhydantoin, 1,3-dibromo-5-ethyl-5-methylhydantoin, 1,3-dibromo-5-n-propyl-5-methylhydantoin, and 1,3-dibromo-5-isobutyl-5-methylhydantoin, or (O) both (M) and (N).

35. The improvement of Claim 29 wherein said microbiocide is (P) 1,3-dibromo-5,5-dimethylhydantoin or (Q) an aqueous microbiocidal solution of one or more active halogen species, which solution is a derivative product in an aqueous medium of 1,3-dibromo-5,5-dimethylhydantoin, or both (P) and (Q).

36. In a process of slaughtering poultry, which comprises a step wherein poultry carcasses or parts thereof are washed with water, the improvement comprising introducing into said water in an amount effective to provide microbiocidal activity 1,3-dibromo-5,5-dimethylhydantoin in the form of solids or as a microbiocidal solution or slurry of 1,3-dibromo-5,5-dimethylhydantoin.

37. The improvement of any of Claims 34, or 35, or 36 wherein said carcasses or parts thereof to be washed have therein or thereon at least one of *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella enteritidis*, *Shigella sonnei*, *Listeria monocytogenes*, and *Campylobacter jejuni*.

38. In a process of slaughtering poultry, which comprises a step wherein poultry carcasses or parts thereof are washed with water, the improvement comprising introducing into said water as a microbiocide at least one 1,3-dibromo-5,5-dialkylhydantoin and/or an aqueous solution or slurry formed therewith, in an amount effective to control at least one of *Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella enteritidis*, *Shigella sonnei*, *Listeria monocytogenes*, and *Campylobacter jejuni*, said at least one 1,3-dibromo-5,5-dialkylhydantoin

having one of the alkyl groups is a methyl group and the other alkyl group contains in the range of 1 to about 4 carbon atoms,

39. The improvement of Claim 38 wherein at least a portion of said 1,3-dibromo-5,5-dialkylhydantoin is introduced as 1,3-dibromo-5,5-dialkylhydantoin, and wherein one or more active bromine species are formed *in situ* in said water.

40. The improvement of Claim 38 wherein said microbiocide includes at least 1,3-dibromo-5,5-dimethylhydantoin and/or an aqueous solution or slurry formed therewith.